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by Yuliani Setyaningsih

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Work Safety Performance of a Contractor in an Oil and Gas Company using Sem-pls Analysis

Kinerja Keselamatan Kerja Perusahaan Kontraktor pada Perusahaan Migas menggunakan Analisis Semp-pls

Clara Dewinda*, Yuliani Setyaningsih, Hanifa Maher Denny

Diponegoro University, Semarang, Indonesia

ABSTRACT

The work safety performance not only reduces work accident rates but also can improve the quality and productivity of a company, especially for oil and gas contractor companies that have to have high competitiveness. Therefore, many contractor companies want to improve their work safety performance. This study measures the influence of the safety climate, job satisfaction, individual characteristics and safety motivation on work safety performance.

This was a quantitative study with cross sectional approach and was analyzed using Partial Least Square software of Structural Equation Modelling (SmartPLS 3.0). There were 3 iteration processes in this analysis where several of the indicators were deleted in order to make the model acceptable. Data collection was conducted by providing questionnaires with closed and open answers to 177 contractor company workers in oil and gas companies in Cilacap, a district in Central Java, Indonesia. The researcher asked the questions in the questionnaire by interviewing directly to the respondents. Questionnaire questions grouped 5 categories for rating significant level of each latent variable.

Path analysis using smartPLS 3.0 software showed that the safety climate has an influence on safety motivation (T Stat 4.815, p=0.000) and on work safety performance (T Stat 3.098, p=0.002). Job satisfaction has an influence on safety motivation (T Stat 3.736, p=0.000). Individual characteristics have an influence on safety motivation (T Stat 4.017, p=0.000) but do not have a significant effect on work safety performance (T Stat 0.957, p=0.339). Safety motivation does not have a significant effect on work safety performance (T Stat 0.021, p=0.984). Based on the final iteration of the model, safety climate variable latent is the most prominent in exhibiting effect on work safety performance of contractor companies in oil and gas company but were found of safety climate indicators that still needed to be improved such as work pressure, personal protective equipment and training effectiveness.The management of contractor companies needs to increase the number of workers adjusted to the workload activity and project deadline. Companies should be provide proper personal protective equipment and provide appropriate training for their workers.

Keywords : *work safety performance, contractor companies, oil and gas company*

ABSTRAK

Kinerja keselamatan kerja tidak hanya memperbaiki kondisi lingkungan kerja tetapi juga dapat meningkatkan kualitas dan produktivitas sebuah perusahaan, terlebih lagi bagi perusahaan kontraktor migas yang harus mempunyai daya saing yang tinggi. Penelitian ini mengukur pengaruh antara iklim keselamatan, kepuasan kerja, karakteristik individu dan motivasi keselamatan terhadap kinerja keselamatan kerja. Penelitian ini menggunakan pendekatan cross sectional dan dianalisis menggunakan perangkat lunak SmartPLS 3.0. Pengumpulan data dilakukan dengan mewawancarai 177 pekerja perusahaan kontraktor di perusahaan minyak dan gas di Cilacap, Indonesia. Hasil penelitian menunjukkan bahwa iklim keselamatan memiliki pengaruh terhadap motivasi keselamatan (T Stat 4.815, p=0.000) dan pada kinerja keselamatan kerja (T Stat 3.098, p=0.002). Kepuasan kerja memiliki pengaruh terhadap motivasi keselamatan (T Stat 3.736, p=0,000). Karakteristik individu memiliki pengaruh terhadap motivasi keselamatan (T Stat 4.017, p=0.000) tetapi tidak memiliki pengaruh yang signifikan terhadap kinerja keselamatan kerja (T Stat 0.957, p=0.339). Motivasi keselamatan tidak memiliki pengaruh yang signifikan terhadap kinerja keselamatan kerja (T Stat 0,021, p =0,984). Berdasarkan pengujian terakhir model, variabel iklim keselamatan laten adalah yang paling besar kontribusinya dalam menunjukkan efek pada kinerja keselamatan kerja perusahaan kontraktor di perusahaan minyak dan gas tetapi ditemukan indikator iklim keselamatan yang masih perlu ditingkatkan seperti tekanan kerja, alat pelindung diri dan efektivitas pelatihan. Manajemen perusahaan kontraktor perlu meningkatkan jumlah pekerja yang disesuaikan dengan aktivitas beban kerja, batas waktu proyek, menyediakan alat pelindung diri yang tepat dan memberikan pelatihan yang sesuai untuk pekerjanya.

Kata Kunci : kinerja keselamatan kerja, perusahaan kontraktor, perusahaan minyak dan gas

Correspondence : Clara Dewinda, Jl. Kolonel Sugiono 3C/438 RT 10/04 Malang.
Email : claradewinda19@gmail.com, 08123456 0500

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INTRODUCTION

Indonesia which has many contracting companies is a developing country that still needs a lot of development on infrastructures as well as on industries of food, technology, oil and gas. It is oil and gas industry with high risk that uses high technology and more fund to run off. Therefore, it requires its partners to be able to meet the occupational health and safety management standards set by the oil and gas company. National policy on Occupational Safety and Health Management System explains the purpose of implementing the Occupational Safety and Health Management System is to manage the safety aspects of increasing the effectiveness of planned, measurable, structured and integrated safety and health protection, preventing and reducing workplace accidents and work-related diseases involving management elements workers/laborers, and/or trade unions/labor unions, and creating a safe, comfortable and efficient workplace to encourage productivity (Government Regulation No. 50 in 2012).

The X oil and gas company as a company engaged in the national energy industry is always faced with the potential risk of hazards in the implementation of work such as fire, explosion, workplace accidents, occupational diseases and environmental pollution. This requires the company to manage health, safety & environment (HSE) aspects to the maximum extent to realize safe, reliable and efficient operations to support the vision and mission of oil and gas company. Contractors as partners of X oil and gas company must get serious attention because their performance can affect performance X oil and gas companies both have an impact on HSE, productivity and company image, so the X oil and gas company develops a Contractor Safety Management System (CSMS) guideline to be required in every procurement of goods/services and must be fulfilled by contractors who work as oil and gas companies the job of procuring these goods/services (Contractor Safety Management System guidelines).

There are a lot of researches on how to improve work safety performance. In the previous one was found that many project partners and the influencing factors of work behaviors were mostly out of workers control. As it has influences from other sides on the performance of workers, then it is important that the commitments of management on safety enhancement is implemented in the provision of an effective safety management system, meaning that a complete safety infrastructure must be provided by empowering every worker (Langford D, 2000). This encourage the contractor companies to make a conducive working environment that make the activities of work are running safely. Contractor companies are trying to develop the regulations and procedures to be implement effectively and efficiently in their work environment. The management system arranged by the companies is to enable workers to implement it well in every work activity they have to improve work safety performance.

The safety climate and the perception of co-workers' behavior regarding safety knowledge have a significant influence on safety behavior. The higher the safety climate, the stronger the influence of safety knowledge on to safety behavior. The effect of safety knowledge on safety performance is mediated by safety behavior (Li Jiang, 2009).

The low job satisfaction of all staff in the health center is due to work conditions and salaries. Doctors' job satisfaction is also low because of poor career opportunities and low salaries. The dissatisfaction of work of midwives is caused by the difficulty level of work carried out in accordance with administrative regulations in Turkey (Said Bodur, 2002).

The safety climate has a positive effect on safety knowledge and safety motivation, while the individual's role or individual characteristics are positively related only to safety motivation. Safety motivation regarding to safety knowledge, and these both variables are positively related to safety performance which in the end safety performance is correlated with the level of workplace accidents (Michael S, 2009).

Safety compliance and safety participation are distinguished as separate components of safety performance. Knowledge of safety and safety motivation also mediate the relationship between the safety climate and safety performance. The result is supporting the conceptualization of the safety climate as an antecedent of safety performance in organizations (Griffin & Neal, 2000).

This research was conducted to find out what things may affect the work safety performance of the contractor companies. The main objective is to analyze the work safety performance of contractor companies in the oil and gas company in Cilacap in order to provide an overview of things that can affect the results of work safety performance and may provide valuable guidance to improve work safety performance within the company. (Figure 1. Research Framework)

METHODS

This study with cross sectional approach and was analyzed using Partial Least Square software of Structural Equation Modelling (SmartPLS 3.0). The type of research in this study was primary research whose data collection uses questionnaires and / or interviews.

A primary research was done by taking data or information from the first source, called the respondent. Data or information was obtained through written questions using a questionnaire or an interview method. This belongs to the category of survey research of which a quantitative study was used to examine the

symptoms of a group or individual behavior. In general, survey used questionnaires as data collection tools. Survey adheres to the rules of the quantitative approach, which is the larger sample you have, the more results reflect the population (Jonathan, 2006).

This study uses a cross sectional study design. The cross sectional research design is to study the dynamic of correlation between factors of risk and effects, using methods of approach, observation or data collection at the same time (point time approach) (Notoatmodjo, 2002). The cross sectional study does not have the ability to explain the dynamic of condition changes or the connection of the observed populations in different time periods, and the dynamic variables that influence it (Nurdini, 2006).

The population in this study were all contractor company workers who worked in the oil and gas company X Cilacap, which reached around 1,500 workers. There is a formula for calculating the amount of research samples with a population of less than 10,000 (Sugiyono, 2010). So the total respondents in this study were 177 respondents. Path analysis in this study was modified based on the results of initial observations conducted by researchers and some literature. Questions in the questionnaire that were asked directly by the researchers to the respondents used a Likert scale with closed and open questions were arranged in 78 questions. The questions raised in this study had been used in previous studies. There are 20 indicators with 5 latent variables in this study. Model Conceptual (Figure 2. Model Conceptual)

Data collection was conducted by providing questionnaires with closed and open answers to 177 contractor company workers in oil and gas companies in Cilacap. Researchers do not include names and companies of respondent in the results of this study. The next step after the data is obtained from data collection, then processing data (editing, coding, and scoring).

This study uses data analysis methods using SmartPLS 3.0 software. The method of data analysis in this study is divided into two. Drawing conclusions on descriptive statistics (if any) is only aimed at existing data sets.

In accordance with the hypotheses that have been formulated, inferential statistical analysis in this study uses SmartPLS 3.0 software. The first step in PLS-SEM analysis is the model conceptualization. This model will explain in the relations between latent variables and their indicators. In this study, the conceptual model is developed based on 20 indicators which are grouped into 5 categories (known as latent variables) named as Safety Climate (SC), Job Satisfaction (JS), Individual Characteristic (IC), Safety Motivation (SM) and Work Safety Performance (WSP). Conceptual model showing relation between latent variables and indicators is shown in Fig 2 where LVs are drawn with oval shape while rectangular shaped elements represent indicators (Sofyan & Heri, 2011). In model conceptual, researcher develops and measurements of constructs. The two types of latent construct measurement models are reflective and formative. Reflective measures are caused by the latent construct, whereas, formative measures cause the latent construct (Ronald & Robyn, 2007). The description of each indicator is presented in path diagrams for each construct shown in Fig 3(a)-3(e).

RESULTS

Overview of Research Sites

The X oil and gas company is one of the seven processing units that have the largest production capacity and the most complete type of product. The X oil and gas company is located in the Central Cilacap sub-district, Cilacap district. Oil and gas company X involves contractors companies in their operations.

Overview of Research Implementation

The study was conducted for + - 1 month (January 2018). The study was conducted by interviewing 177 respondents who were workers from the X oil and gas company contractors in Cilacap.

Descriptive Analysis

This study consisted of 5 latent variables with a total of 21 indicators divided into these latent variables. Following are the criteria for description data for safety climate, job satisfaction, individual characteristic, safety motivation and work safety performance.

1.Safety Climate (SC)

Safety climate data is the result of respondents' answers interviewed directly by the researcher. The latent climate safety variable consists of 7 indicators (X1 (communication and support), X2 (compliance procedures), X3 (work pressure), X4 (personal protective equipment), X5 (relationships in the workplace), X6 (safety regulations) and X7 (training effectiveness)) with 40 closed questions.

From the results of the interview, it can be seen that the X5 indicator (relationship in the workplace) is the largest percentage indicator for the climate safety latent variable and the smallest is the X1 indicator (communication and support). The results of the average calculation for the safety climate latent variables are 61.25% which are included in the criteria of good.

2.Job Satisfaction (JS)

The following are the results of the descriptive analysis for the latent variable job satisfaction which consists of 5 indicators (X8 (work), X9 (coworkers), X10 (supervision), X11 (job promotion) and X12 (wages)) with 20 closed questions.

From the results obtained, it can be seen that the X10 indicator (supervision) is the largest percentage indicator for the latent variable job satisfaction and the smallest is the X12 indicator (wage). Calculation of the average value for the latent variable job satisfaction is 64.91% which is included in the criteria of good.

3.Individual Characteristics (IC)

Individual characteristics consist of 4 indicators, X13 (education), X14 (working period), X15 (position in work) and X16 (work experience). The following are the results of research for individual characteristics of respondents.

Indicator X13 (education) obtained results of 18.08% elementary school education, 38.42% junior high school and 43.5% high school.

Indicator X14 (tenure) obtained a result of 53.67% for a work period of 1-5 years, 34.46% for a work period of 6-10 years and the rest for work periods of more than 10 years.

Indicator X15 (position in work) obtained results of 77.97% for non-skill positions, 21.47% for skill positions and 0.56% for management positions.

Indicator X16 (work experience) obtained 51.41% for 0-5 years' work experience, 32.2% for 6-10 years' work experience, 9.6% for 11-15 years' experience and the rest for more than 15 work experience year.

4.Safety Motivation (SM)

The following are the results of the descriptive analysis for the latent variables of safety motivation which consist of 2 indicators Y1 (need to get safety) and Y2 (desire to maintain safety) with 6 closed questions.

From the results obtained, it can be seen that the indicator Y1 (the need to get safety) is an indicator that has a greater percentage than the indicator Y2 (the desire to maintain safety). Calculation of the average value for the latent variable of safety motivation has an average value of 69.51% which is included in the criteria of good.

5.Work Safety Performance (WSP)

The following are the results of the descriptive analysis for the latent work safety performance variables which consist of 2 indicators, Y3 (safety compliance) and Y4 (safety participation) with 12 questions.

From the results obtained, it can be seen that the Y3 indicator (safety compliance) is a greater percentage indicator compared to the Y4 indicator (safety participation). Calculation of the average value for the latent variable work safety performance has an average value of 53.83% which is included in the criteria quite well.

[Table 1. Path Coefficients Test Results]

Safety Climate of Safety Motivation Statistical Analysis

Testing the hypothesis in this study uses a significance level at alpha 5%, then the t-statistical value used is 1.96. From the path coefficients table above, it can be seen that the safety climate has a significant positive effect. This is indicated by the path coefficient value (0.376) marked positive and significant at alpha 5% which is indicated by the t-statistic value 4.815 > 1.96. So the better the climate of safety, the better the safety motivation will be. Based on these results it can be concluded that the first hypothesis is accepted.

The direct influence between the safety climate and safety motivation (Table 1), shows that there is a significant direct effect if the p-value < 0.05. The latent variable of safety climate to the latent variable of safety motivation has a p-value of 0.00 < 0.05. This shows that the safety climate has a significant direct effect on safety motivation by 37.6% (table 2) and total effect of safety climate on safety motivation is 37.6% (table 3). The safety climate does not have an indirect effect on safety motivation because there is only one direction from the safety climate to safety motivation.

Safety Climate on Work Safety Performance Statistical Analysis

From the path coefficients table above, it can be seen that the safety climate has a significant positive effect on work safety performance. This is indicated by the path coefficient value (0.447) which is positive and significant at alpha 5% which is indicated by the t-statistic value of 3.098 > 1.96. So the better the safety climate, the better the safety performance will be. Based on these results it can be concluded that the second hypothesis is accepted.

The safety climate p-value on work safety performance, obtained a value of 0.02, it shows that the safety climate has a significant direct effect on work safety performance of 44.7%. Based on the model developed in this study, there is no significant indirect effect between safety climate on work safety performance through safety motivation because the t-statistic value shown in the specific indirect effects table is 0.020 < 1.96 and its indirect effect only 0.1% (table 2), and the total effect of safety climate on work safety performance is 44.8% (table 3).

Job Satisfaction on Safety Motivation Statistical Analysis

From the path coefficients table above, it can be seen that job satisfaction has a significant positive effect on safety motivation. This is indicated by the path coefficient value (0.299) which is positive and significant at alpha 5%, which is indicated by the t-statistic value of 3.736 > 1.96. So the better the job satisfaction, the better the safety motivation will be. Based on these results it can be concluded that the third hypothesis is accepted.

P-value of job satisfaction on safety motivation, obtained p-value of 0.00, it shows that job satisfaction has a significant direct effect on safety motivation of 29.9%. Based on the model developed in this study, there is no indirect effect between job satisfaction on safety motivation because there is only one direct direction from job satisfaction to safety motivation, and there is no indirect effect between job satisfaction on work safety performance through safety motivation because the t-statistic value shown in the specific indirect effects table is 0.019 < 1.96 and the indirect effect is only 0.1% (table 2), so the total effect of job satisfaction on safety motivation is 29.9% (table 3).

Individual Characteristics on Safety Motivation Statistical Analysis

From the path coefficients table above, it can be seen that

individual characteristics have a significant positive influence on safety motivation. This is indicated by the path coefficient value (0.264) which is positive and significant at alpha 5%, which is indicated by the t-statistic value of 4.017 > 1.96. So the better the individual characteristics, the better the motivation for safety. Based on these results it can be concluded that the fourth hypothesis is accepted.

P-value variable individual characteristics of the safety motivation variable, obtained p-value of 0.00, it shows that individual characteristics have a significant direct effect on safety motivation of 26.4% (table 1) and total effect of individual characteristics on safety motivation is 26.4% (table 3). Based on the model developed in this study, there is no indirect effect between individual characteristics on safety motivation because there is only one direction from individual characteristics to safety motivation.

Individual Characteristics on Work Safety Performance Statistical Analysis

From the path coefficients table above, it can be seen that individual characteristics have a not significant positive effect on work safety performance. This is indicated by the path coefficient (0.121) which is positive and not significant at alpha 5%, which is indicated by the t-statistic value of 0.957 < 1.96. Based on these results it can be concluded that the fifth hypothesis is rejected.

P-value variable of individual characteristics to work safety performance variable, obtained p-value of 0.339 > 0.05 shows that individual characteristics have no significant direct effect on work safety performance and the amount of direct influence is 12.1% (table 1). Based on the model developed in this study, individual characteristics also have no indirect effect on work safety performance through safety motivation because in the specific indirect effects table it can be seen that the t-statistic value is 0.021 > 1.96 and its indirect effect is only 0, 1% (table 2), so the total effect of individual characteristics on work safety performance is 12.2% (table 3).

Safety Motivation on Work Safety Performance Statistical Analysis

From the path coefficients table above, it can be seen that safety motivation has a non-significant positive effect on work safety performance. This is indicated by the path coefficient value (0.004) which is positive and not significant at alpha 5% which is indicated by the t-statistic value of 0.021 < 1.96. Based on these results it can be concluded that the sixth hypothesis is rejected.

P-value of safety motivation variable on work safety performance variable, obtained p-value of 0.984 > 0.05, it shows that safety motivation does not have a significant direct effect on work safety performance and the direct effect is only 0.4% (table 1) and total effect of safety motivation on work safety performance is 0.4% (table 3). Based on the model developed in this study, safety motivation also has no indirect effect on work safety performance because there is only one direction of safety motivation on safety performance.

To validate the overall model, it can be seen from the absolute goodness of fit (GoF) whose formula is as follows:

$$GoF = \sqrt{\overline{Com} \times \overline{R^2}}$$

$$GoF = \sqrt{0{,}800118 \times 0{,}5405}$$

$$GoF = 0{,}657662$$

The upper striped Com value is the average communalities obtained from the average loading factor. The upper R2 value is obtained from the average R2 value. The results of the calculation of the GoF value of 0.657662, this can be interpreted that the model in this study has a high ability in explaining empirical data, so overall it can be said that the model formed is valid. High validity overall.

DISCUSSION

Influence of Climate of Safety on Safety Motivation

The results of this study indicate that the safety climate has a positive influence on safety motivation. This is consistent with other studies which found that some safety management practices have a direct and indirect relationship with the components of work safety performance, safety compliance and safety participation. Safety knowledge and safety motivation is found as a key mediator in explaining the relationship. Also studies that report on the climate of safety have a positive effect on safety knowledge and safety motivation (Michael S, 2009).

Other research results also report that the climate of safety and the perception of coworkers' behavior on safety knowledge have a significant influence on safety behavior. The higher the safety climate, the influence of safety knowledge is also stronger on safety behavior. The effect of safety knowledge on safety performance is mediated by safety behavior (Li Jiang, 2009).

Influence of Safety Climate on Work Safety Performance

The results of testing the second hypothesis indicate that the safety climate has a significant positive effect on work safety performance. This is consistent with the results of other studies that found that safety knowledge and safety motivation mediate the relationship between climate safety and safety performance. The results support the conceptualization of the safety climate as an antecedent of work safety performance (Griffin & Neal, 2000).

There are also other studies that suggest that the safety climate has a significant negative relationship with near misses and injuries and has a significant positive relationship between safety climate and work safety performance (safety compliance and safety participation) (Carol, 2014).

Companies that carry out OSH management practices well, the company will get financial benefits, reduced lost time and compensation costs for workers. An additional benefit obtained from the implementation of a good OHS management system is the increase in work safety and productivity performance, as well

(Michael S, 2009). Also other studies that report on behavioral-based safety approaches can improve work safety performance in the construction industry in Hong Kong (Helen & Steve, 1997).

Other studies also report that there is a strong relationship between age and worker experience with their level of safety performance. Results analysis showed that ages between 16 and 20 years showed higher accident rates compared to the age in that range. Further data analysis also showed that accident rates tended to decline in 28 year old workers and reached their lowest in their mid-forties. These results indicate that the longer the work period, the more experienced they will be, therefore, become more aware of safety procedures and requirements (Edwin, et al, 1999).

Influence of Safety Motivation on Occupational Safety Performance

The results of the sixth hypothesis testing indicate that safety motivation has a non-significant positive effect on work safety performance. The results of this study are not in line with the hypothesis in other studies stating that safety motivation has a significant positive effect on work safety performance. In the study it was found that safety knowledge and safety motivation mediated the relationship between climate safety and work safety performance (Neal, et al, 2000)

The difference in results in this study is due to the influence of individual characteristics and job satisfaction on respondents who were sampled in this study. Workers 'perceptions of company image relating to safety management systems and low salaries also affect workers' safety motivation. Workplace accidents also have a negative impact on a company's productivity and competitiveness. Safety management has a positive influence on safety performance, competitiveness performance, and financial-economic performance (Muñiz, 2009). Safety leadership with high quality will also improve a proactive safety culture and can promote good safety performance (Tsung-Chih, 2005).

Research Limitations

Some of the limitations in this study and need to be considered by future researchers are as follows:

1. This study is only limited to the number of respondents as many as 177 people and is limited to contractor workers in the X oil and gas company Cilacap, so the results of the study are inaccurate if they are aimed at a wider population.

This study is only limited to safety climate, job satisfaction and individual characteristics considering there are many other factors that also affect safety motivation and work safety performance.

CONCLUSION

This study provides empirical evidence regarding the relationship between climate of safety, job satisfaction, safety motivation, individual characteristics and work safety performance in oil and gas company X in Cilacap. Four of the 6 research results show that the initial hypothesis was proven in this study. Among them are, (1) the climate of safety has a significant positive effect on safety motivation and work safety performance. (2) Job satisfaction has a significant positive effect on safety motivation. (3) Individual characteristics have a significant positive effect on safety motivation. And (4) Individual characteristics and safety motivation do not significantly influence work safety performance.

Based on the results of the research that has been conducted, there are several suggestions that can be considered for X oil and gas company and its contractors, (1) The management of contractor companies are expected to be able to improve effective and efficient two-way communication between workers and their leaders. The leaders should build more active communication to better support their workers to create better relationships in the workplace. (2) The management of contractor companies should better calculate precisely the project schedule so that the workload of the workers is not too heavy or the management should increase the number of workers if the project schedule is too tight or if there are work delays due to unexpected things so resulting in time setback from the schedule that has been set. Then regarding personal protective equipment (PPE) and training, the management needs to provide proper PPE and appropriate training for the workers. (3) The management of the contracting company should conduct an evaluation for the wage system because the workers feel that the wages they receive do not match the work they do. (4) The management of contractor companies needs to do a better selection process when recruiting prospective workers because if workers have good individual characteristics, at least they have a good safety motivation and level of compliance. (5) Individual characteristics do not necessarily improve work safety performance, therefore the management of the X oil and gas company Cilacap should be able to direct contractors to pay more attention to aspects related Occupational Safety and Health. (6) The management of the contracting company should pay more attention to being able to improve work safety performance, not just to give understanding to the workers that they must have high safety motivation because safety motivation is not the only thing needed to improve work safety performance. The X Oil and gas company needs to evaluate policies related Occupational Safety and Health for its contractors.

Conflict of Interest

No Conflict of Interest

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